

AMENDMENTS TO THE SPECIFICATION:

Please replace paragraph [0028] with the following amended paragraph.

[0028] One surface of the mesa 12 has a piezoelectric material element 22 bonded to it using an adhesive 14. Alternatively, the piezoelectric material element 22 may be attached using solder, thin film epoxies or the like. The piezoelectric material element 22 has a piezoelectric material width W_a . The piezoelectric material width W_a is shown as being larger than both the mesa width W_m and the chamber diaphragm width W_c , however the piezoelectric material width W_a can be a variety of sizes and will be optimized for the process parameters and the ultimate function. For instance, it may be desired when building sensors that the piezoelectric material width W_a be small relative to the chamber diaphragm width W_c . It is also possible in some cases for the piezoelectric material width W_a to be smaller ~~that~~than mesa width W_m .

Please replace paragraph [0042] with the following amended paragraph.

[0042] The mesas 12, 62 may be made out of a variety of materials such as the same material as used for the chamber diaphragm 10, oxides, nitrides, polyimides, metals and ceramics, among others. The mesa thickness can be any size so long as the mesas 12, 62 and the chamber diaphragm 10 can still be bent by the piezoelectric material elements 22, 60. The minimum mesa thickness T_{m1} of mesa 12, when the piezoelectric material width W_{a1} is greater than the mesa width W_m , should be chosen

should be such that the sum of the thicknesses of the mesa 12, insulative layer 40, and electrical interconnect layer 18 is greater than the sum of the thicknesses of the insulative layer 40, electrical interconnect layer 18, and the dielectric layer 20. This will assure that the piezoelectric material element 22 is in direct contact only on the surface of the mesa 12 and not the top of the dielectric layer 20. The mesa thickness T_{m2} , and mesa thickness T_{m1} when the piezoelectric material width W_{a1} is not greater than the mesa width W_m , has no minimum. It should be noted that it is possible to build the piezoelectric transducer 1 in a bimorphic configuration, such as shown in Figure 6, utilizing only one mesa on one of the chamber diaphragm 10 surfaces, either chamber diaphragm upper surface 38 or chamber diaphragm lower surface 36, that is setting one of either mesa thickness T_{m1} or mesa thickness T_{m2} equal to zero. The mesa thicknesses T_{m1} , T_{m2} used for a particular application will be determined by performance and manufacturability constraints. It should also be noted that although the mesa thicknesses T_{m1} , T_{m2} are shown as being substantially the same, they need not be and may vary considerably from each other. If the mesa thickness T_{m1} , T_{m2} is greater than approximately 10% of the chamber diaphragm thickness T_c , there is an added mechanical advantage to the respective piezoelectric material element 22, 60. This is because expansion or contraction of the piezoelectric material element 22 will create a greater bending moment on the chamber diaphragm 10 when the piezoelectric material element 22, 60 is further displaced from the neutral surface N of the diaphragm 10. The neutral surface N is defined as the surface within the diaphragm 10 and the adjoining structures, such as the mesas 12, 60, where the shear stress passes through zero. That is, the shear stresses are compressive on one side of the neutral surface N and tensile on the other. There are many combinations of dimensions and properties of the chamber diaphragm 10, mesa 12, and piezoelectric material element 22 that will provide acceptable performance characteristics.